



A.D. 1829 . . . N^o 5815.

S P E C I F I C A T I O N

OF

MOSES POOLE.

TUBULAR STEAM BOILERS.

L O N D O N :

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY :

PUBLISHED AT THE QUEEN'S PRINTING OFFICE, EAST HARDING STREET,
NEAR FLEET STREET.

Price 9d.

1854.



A.D. 1829 N° 5815.

Tubular Steam Boilers.

POOLE'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, MOSES POOLE, of the Patent Office, Lincoln's Inn, Gentleman, send greeting.

WHEREAS His present most Excellent Majesty King George the Fourth, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Eighth day of July, in the tenth year of the reign, did, for Himself,
5 His heirs and successors, give and grant unto me, the said Moses Poole, His special licence that I, the said Moses Poole, my executors, administrators, and assigns, or such others as I, the said Moses Poole, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and
10 at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, and also in all His said Majesty's Colonies and Plantations abroad, the Invention of "CERTAIN IMPROVEMENTS IN THE APPARATUS FOR RAISING OR GENERATING STEAM AND CURRENTS OF AIR, AND FOR THE APPLICATION
15 THEREOF TO LOCOMOTIVE ENGINES, AND OTHER PURPOSES" (communicated to me by a certain foreigner residing abroad); in which said Letters Patent is contained a proviso, obliging me, the said Moses Poole, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of the said Invention, and in what manner the same is to be performed, and
20 to cause the same to be enrolled in His said Majesty's Court of Chancery within six calendar months next and immediately after the date of the said recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Poole's Improvements in the Apparatus for Raising or Generating Steam, &c.

NOW KNOW YE, that in compliance with the said proviso, I, the said Moses Poole, do declare the nature of the said Invention is described as follows (that is to say):—

The improvement in the apparatus for raising or generating steam, which I shall first describe, consists in the mode of forming the boiler, which is composed 5 of a series of tubes (5, 5, 5,) connected at their ends in such manner that they shall form one continued channel or passage through the whole, as shewn by the arrows (Figure 3). At one end of the series, the feed pipe (*a*) from the pump is attached, and to the other a strong vessel (Q, Figure 3), which receives the steam from the boiler when it is formed, as the water is driven through the 10 boiler from the feed pipe. In this vessel any water that may have passed unconverted into steam in its passage, is separated by its own gravity, and is again driven through the boiler by means of a force pump (R) provided for the purpose; in some cases the water may be allowed to pass with the steam from this vessel through the engines, which are peculiarly formed for the purpose, as 15 will be presently shewn, to the second vessel (M), where it separates by its own gravity, as in the first case, and from which it is also recirculated through the boiler by the pump provided for the purpose. The steam is taken from the top of the first vessel or separator (Q), and carried by a pipe (*w*) to its required situation. The pipes or tubes forming the boiler are joined by screwing each 20 into a hollow casting (*r*, Figure 2 and 3); the joint is made good by bringing back a collar before a nut packed with asbestos or fire lute. The pipes may be of any length or size proportioned to the power required; those shewn in the Drawing are about three feet six inches long, and about one inch bore; they are place parrelled to each other over the fire, down the sides, and under the 25 fire, thus forming a sort of cage work, in which the fuel is placed. In the end of the castings a bolt (*t*) is screwed opposite the end of every pipe, so that at any time it may be withdrawn and the pipes cleaned. This may be done by forcing a rod up and down the pipes, armed with a barb at its end, like the rods used to clean gun-barrels, or any other simple mode; when the 30 incrustation is thus mechanically removed from the sides of the tubes, they are washed out by pumping water through them. This being done, the bolt is again screwed into its place, packed under the head or not, as circumstances require. As the quantity of water in the tubes is very small compared with the heating surface exposed, and there is no circulation or supply except by the 35 force pumps which are worked by the engines, it is necessary that some means should be used when the engine stops to keep up the supply and circulation, otherwise the pipes will soon become red hot, and do considerable mischief. This may be done by hand or by a small cylinder provided expressly for the

Poole's Improvements in the Apparatus for Raising or Generating Steam, &c.

purpose, when the boiler is applied on a carriage. I effect this by drawing the wheels off the ground, and again setting the engines to work, and consequently the pumps. To do this a chain is made to pass round a shaft or windlass (T, Figure 2 and 4), the other end being connected to the bottom of a lever or prop (i) a few inches longer than the radius of the wheel, which being drawn by winding the windlass by a shaft which goes through a tube to the pinion, lifts the hind wheels off the ground; the same contrivance also acts as a drag in going down hill, or stopping in any other situation, should it at any time be necessary after the steam has been cut off from the engines. Instead of winding the carriage off the ground by hand to drag it going down hill, or for the purpose of working the pumps when it stops, I frequently use the steam itself, and I effect this by fixing a small cylinder (6) under the perch, or in any other convenient situation, fitted up with a piston and rod in the ordinary way; to the end of the piston rod a chain (7) is fixed, reaching to the windlass chain or to the shoe or foot direct of the lever; on admitting the steam at one end of the cylinder (which is done by a pipe and an ordinary three-way cock) the piston is forced in, and draws the carriage off the ground in the same manner as if drawn by the windlass; on turning off the steam the piston returns, and the carriage will again rest on its wheels on the ground. This plan is very convenient for dragging, as the steam may be thrown on and modified at pleasure to any extent, and also for stopping suddenly if required on the road. The joint at the head of the lever or prop may be fixed to the frame or to the axle. I shall now describe my said improvement in the apparatus for raising or generating steam as applied to a locomotive engine or carriage, for which purpose it is eminently adapted; and I shall describe the mode of fixing the engines, pumps, &c., which will explain the subject more fully and be readily understood. The steam is made to act on the hind wheels to propel the carriage by two high pressure engines or cylinders laying one on each side of the perch A, A, Figure 1, and connected to the axle of the hind wheels by a loop from the piston rod. The axle is bent into two cranks B, B, standing at right angles with each other, similar to the usual mode now in use in steam boats to produce a rotary motion of the paddle wheels; one or both of the wheels are connected to the axle at pleasure by bolting to the rim of the wheel a lever (C, C) firmly fixed to the end of the axle at (D, D), being keyed or screwed on it. One wheel is shewn in the Drawings connected at (E), the other not connected at (F). The valves are worked by eccentrics on the axle in the usual mode; the parallel motion is preserved by a wheel (C, f, 2,) fixed on the end of the piston rod, and working in a guide (H) fixed to the perch or frame of the carriage to which the engines are bolted. The steam ways of

Poolé's Improvements in the Apparatus for Raising or Generating Steam, &c.

the cylinder are different from those now in use, and are contrived to meet the peculiarities of the boiler. Instead of the steam being admitted and withdrawn from the upper part of the cylinder, it is made to escape from the lowest, by which means any water which may happen to come over with the steam, is effectually thrown out with the steam as it escapes through the eduction way. 5 The mode of effecting this is by casting in the covers of the cylinders a channel or opening (I, *f*, 5), which shall correspond or fit, when fixed at the top side with the usual eduction way (K), the other end reaching to and opening into the cylinder at the lowest part (L), thus effecting a continued opening from the under side to the eduction pipe of the cylinder. I shall next describe my mode 10 of producing currents of air in chimneys, &c., by causing steam above atmospheric pressure to escape in the direction of and within the flue in such a manner that the steam, by passing with considerable velocity through the chimney, shall drive out the column of air in the chimney with force, and thus set the air in rapid motion in the same direction. The current of air thus set 15 in motion in the chimney will draw after it a corresponding quantity of air to fill up the partial vacuum thus produced through any channel or channels made to convey it, and thus a constant current of air or draft may be kept up while the steam current is in operation for any length of time. Steam may be obtained either from a boiler or other source for this purpose, and as one of 20 the most useful applications of this principle is to keep up a strong draft where high chimneys or other means cannot be conveniently obtained, for instance in a steam carriage, I shall describe the mode of applying it for producing a valuable draft on a steam carriage, by which will be seen the mode of applying it to produce "drafts or currents of air" in any other situation. I shall now 25 describe the said Invention as applied to a locomotive engine or carriage, for which purpose it is eminently adapted; and I shall describe the carriage generally, shewing the necessary points connected with the said improvements. First, to produce the draft, I take the steam from a vessel (M, Figs. 2, 3, 4), into which the eduction pipe from the engines is made to terminate, and 30 convey steam above atmospheric pressure. A pipe (3) from this vessel conveys the steam to the chimney (N), where it is made to discharge itself upwards through four small tubes, united at their base with the pipe (3) from the vessel (M). These tubes are so small that all the steam from the vessel (M) cannot escape suddenly as it comes from the engines; the vessel will consequently 35 require time to empty itself down to atmospheric pressure, and thus the steam will escape in a continued current up to the next discharge of the engine, and drive the column of air uniformly before it. The column thus set in motion up the chimney must draw its supplies from beneath through the fire, every other com-

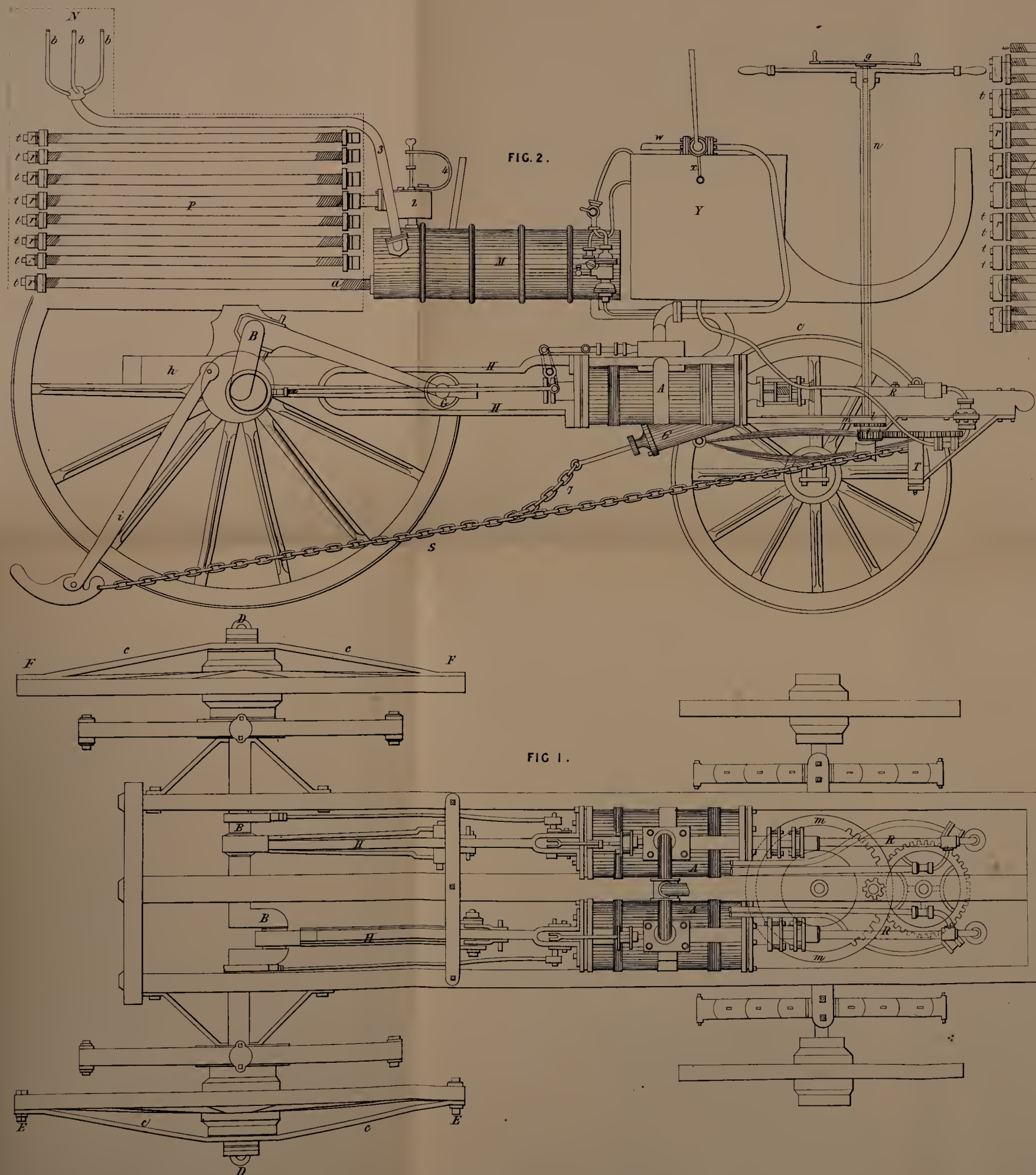


FIG. 3.

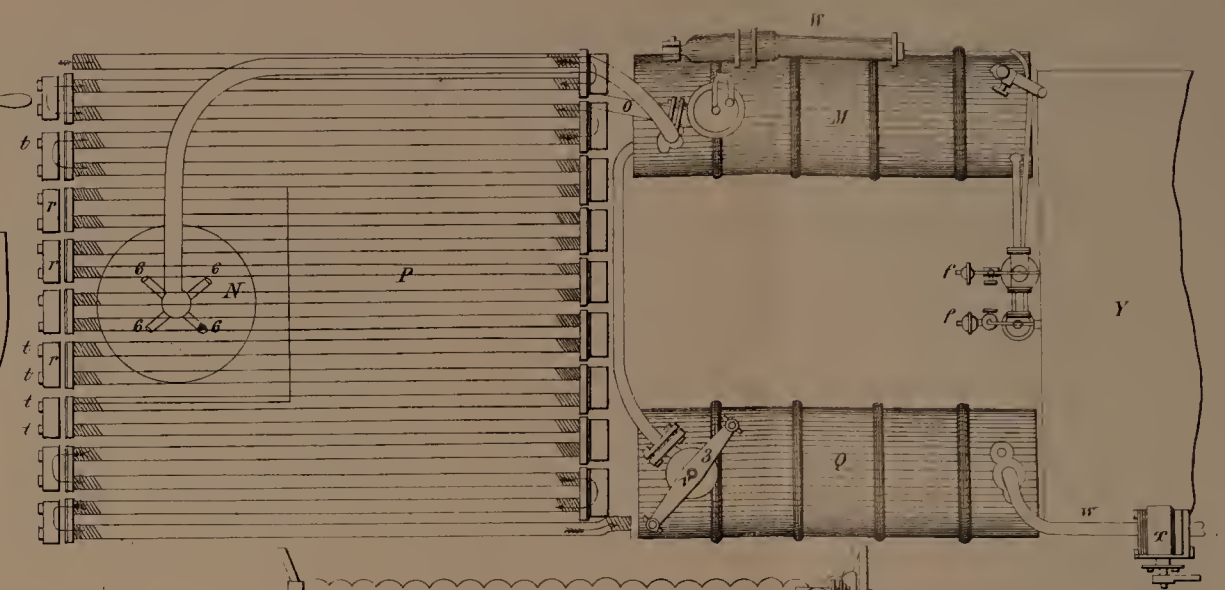


FIG. 4.

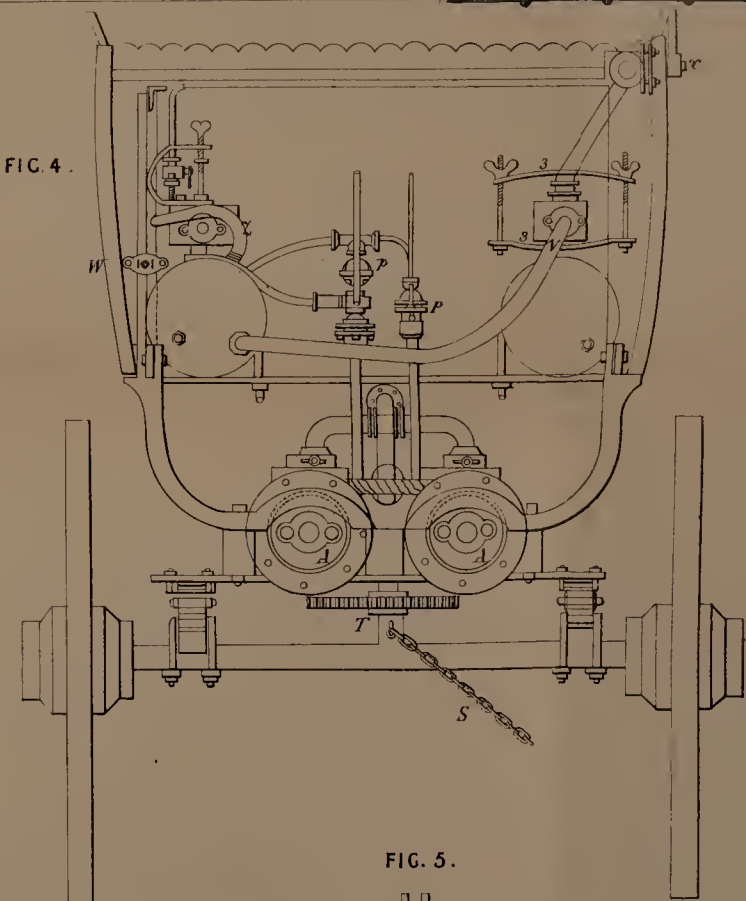
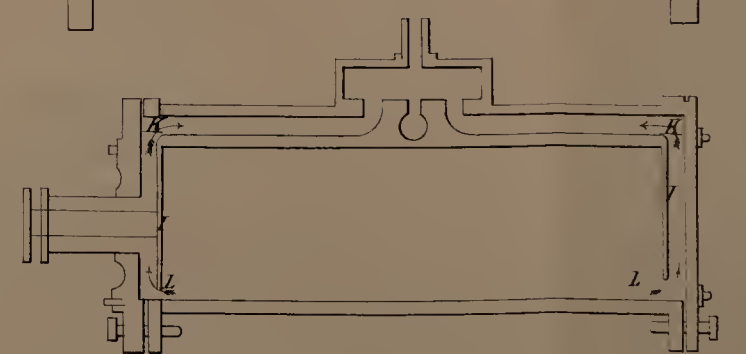
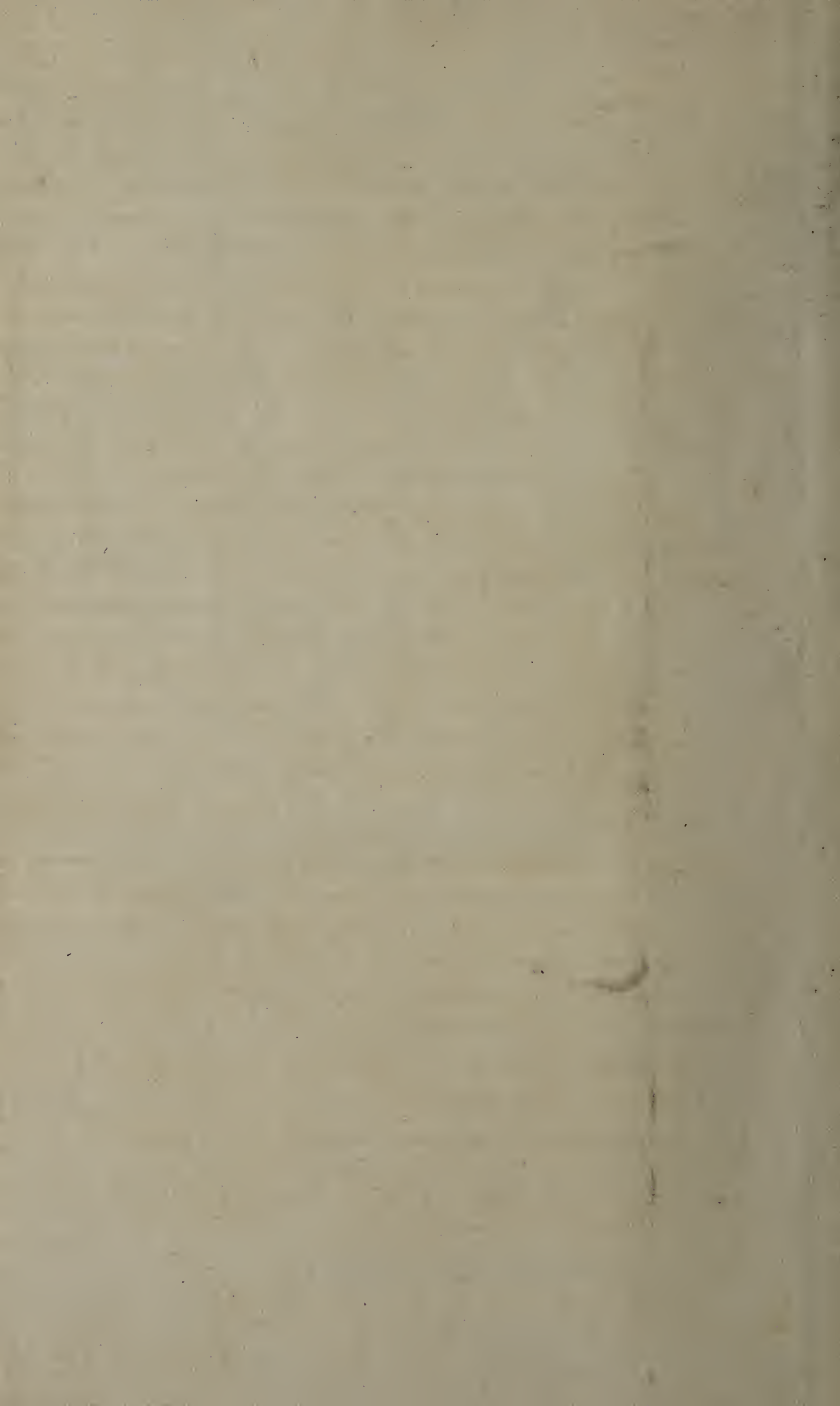


FIG. 5.



The encolled drawing is not colored



Poole's Improvements in the Apparatus for Raising or Generating Steam, &c.

munication with the atmosphere being cut off. The area of the discharging tubes in the chimney must be in proportion to the quantity and pressure of the steam in the vessel (M) and the intensity of draft required. As the quantity of steam discharged in the vessel (M) may be very considerable at certain times, which
 5 would produce a strong pressure against the pistons, as well as cause too great intensity of draft, a safety valve (Z, Fig. 2), must be placed on it, from which a waste pipe (o) must be carried to the chimney or any other convenient situation of sufficient capacity to admit of an easy discharge of all such steam from the engines. This valve by the spring (4) on it, may be fixed to any
 10 pressure, and which will regulate the force of the discharge through the draft tubes; for should the pressure in the vessel (M) get above that force, the valve will lift and allow the escape of the overplus of steam through the waste pipe. The degree of draft may thus be regulated at pleasure, for it will always be in proportion to the force of discharge. The steam from high pressure
 15 engines is frequently thrown into the flues and chimneys, but never under pressure or in a continued current, so as to produce a draft, and the effect is that it rather injures the fire. Every other part of the apparatus connected with the locomotive engine not described, is generally known by engineers, and may be seen by reference to the Drawings accompanying this.

20 In witness whereof, I, the said Moses Poole, have hereunto set my hand and seal, party hereto, the Eithgth day of January, in the year of our Lord One thousand eight hundred and thirty.

MOSES (L.S.) POOLE.

AND BE IT REMEMBERED, that on the Eighth day of January, in the
 25 year of our Lord 1830, the aforesaid Moses Poole came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

30 Inrolled the Eighth day of January, in the year of our Lord One thousand eight hundred and thirty.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
 Printers to the Queen's most Excellent Majesty. 1854.

